Health economics of screening for hypertension in Vietnam

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Chapter 7

General discussion

Background

Vietnam is experiencing a rapid socio-economic development and as a consequence, there is also a shift in disease patterns [1]. At present, the health sector in Vietnam is urged to deal with the increasing problems of non-communicable disease, while it lacks experience and evidence to identify appropriate and effective solutions. Cardiovascular diseases (CVD) are currently a main health problem, accounting for 14% of the burden of disease in the world, and 12% in Vietnam [1, 2]. To deal with this problem, interventions focusing on both primary and secondary prevention are needed using a range of strategies [3]. The example of CVD as a non-communicable disease [4] is taken to conduct several studies to provide evidence that could inform decision makers in Vietnam and in other developing countries with similar conditions, to assist them in making choices and allocating resources in this area.

Research questions

As outlined in the introduction section, the main research question read "What are cost-effective ways of screening for and managing hypertension to prevent development of CVD in Vietnam?".

Sub-questions concerned:

1. Which model is most appropriate to measure CVD risks in Vietnam?
2. How good is adherence to hypertension treatment and which factors affect adherence in the study population?
3. How will adherence to treatment influence outcomes?
4. What is the burden of disease if hypertension is not treated or controlled?

5. What are the future risks of CVD in case of non-treatment or non-adherence?
6. What quality of life is experienced by hypertensive patients in Vietnamese population?
7. Which is the most cost-effective population screening strategy to identify patients with hypertension at risk for future complications, modelling various screening and treatment coverage scenarios?
8. What recommendations can be given to the national programs to identify patients with hypertension and to minimize risks of further disease development in those patients?

Below, these research (sub)questions are revisited to analyze objectives/findings achieved and still remaining further work to be addressed in follow-up studies.

Main findings

We have confirmed the importance of hypertension as a public health problem in Vietnam. In one rural region, the prevalence of undiagnosed hypertension was 12.3%. These hypertensive patients were not aware of their health problem before the screening was done (Chapter 2) [5]; ergo, the relevance of our study was confirmed. To estimate the effects of this large number of undiagnosed hypertensive patients on future health consequences, a cost analysis was applied which suggested that if high blood pressure was left untreated or uncontrolled, the burden to the hospital and health care system in the future would be considerable (Chapter 3; sub-question 4). For example, for hypertension, the length of hospital stay was six days, with a total direct cost only for hypertension at Int$ 147 per hospitalization, while the cost of annual hypertension treatment was

Int$ 69 [6, 7]. Furthermore, if complications arose, such as myocardial infarction (MI), the cost per acute hospitalization rose to Int$ 12,371, in the context of a total per capita expenditure on health of Int$ 308 in 2013 [6, 8, 9]. The burden of hypertension for the patients was also shown to be relevant, measured by health utility (Chapter 4; sub-question 4 and 6), at 0.73 among hypertensive patients, while health utility among the general population in Vietnam was 0.93 if converted in the same instrument [10,11]. Furthermore, the screening and management strategy most likely to be (cost-)effective was identified by modeling. Notably, this analysis indicated that screening combined with increasing the coverage of treatment was most cost-effective in both ten years and lifetime scenarios (Chapter 6; sub-question 7). The key factors to guide screening were age and sex; screening the older aged population was more cost-effective, and screening males was more cost-effective than screening females of the same age [7]. Obviously, such models require good input data and include assumptions, which are prone to limitations because many key data are not available in a reliable form. For example, our investigation into adherence to treatment revealed that it was more complex than it at first appeared; providing prescriptions or medicines was not a guarantee that patients would use them, but also, patients could and did access medicines on the free market even if they are not using medicines prescribed by the health care stations (sub-question 2 and 3) [12]. Together, all of the above pieces of information can support the development of appropriate strategies and guidelines for the health system in Vietnam to deal effectively with hypertension and its consequences (sub-question 8). Our approach has demonstrated the usefulness of combining health economics and modelling to guide development of policies to manage non-communicable diseases. These diseases are expected to present the main health problems in the

future in Vietnam, including CVD, along with diabetes, cancer and chronic obstructive pulmonary disease (COPD).

Implications

CVD risk model

To predict the CVD risks and consequences, models are used based on data collected either in dedicated studies or taken from routine national databases. In the first study reported here (Chapter 2), we identified the most suitable CVD prediction model for Vietnam. Among various available models, we explored three that seemed representative for Asian populations or potentially useful for application in Vietnam [13-15]. One challenge was that the model structures and CVD risk outcome varies between the models, because of the different components in each model. For example, input variables, outcome variables, time horizon and values in each equation differed [5, 16]. Notably, patients with a history of CVD have not yet been included in these models, which should be noted in all further analysis or clinical settings [17]. Although the existing evidence did not permit us to identify definitively the best prediction model for the Vietnam population, based on best available evidence we could recommend that the Asian and Chinese Multiple-provincial Cohort Study as the most appropriate for Vietnam (sub-questions 1,5 and 8).

Adherence to hypertensive treatment

In most modelling exercises, we had to make assumptions about the percentage of patients receiving medical treatment and we assumed that these patients are actually following the treatment regime as prescribed. Nevertheless, it is widely known that not all patients will follow the doctor's instructions exactly [18]. This is especially true for chronic conditions when patients are asked to continue using the medication for years to avoid the development of complications and

more serious diseases. Similar to a previous review [18], our study on adherence to antihypertensive medication (Chapter 3; sub-questions 2 and 3) revealed that only half of the patients was adherent to the prescribed treatment [12]. Various methods have been applied to measure adherence to medicine, each with advantages and disadvantages [19]. One finding from our study, possibly also relevant for other research in developing countries, is that quantifying the level of adherence based on the uptake of prescriptions may underestimate actual intake of medication when patients can buy medicines without a prescription. Furthermore, factors were identified for doctors to focus upon in their efforts to improve adherence of patients, such as age and awareness of complications of hypertension (sub-question 8). Having a history of CVD, and thus a higher risk of CVD in the future, was elsewhere reported to be a predictor to better adherence [20] but we could not confirm this in our study [12]. Adherence improvement is associated with better outcomes, but few studies on solutions to improve adherence to medicine could demonstrate success [21], so there is still much room for improvement in enhancing adherence to medicine in real life practice.

Burden of disease

An economic evaluation to estimate the burden of disease (Chapter 4) indicated that undiagnosed or incorrect treatment of hypertension involves major resources and costs [6, 22], even when patients are admitted to a hospital only for hypertension. This came out of the analysis even though we did not take indirect costs into account, such as production loss due to illness. The total costs would then be much higher than only the direct costs, in particular in the Vietnamese setting where most nursing care is provided by family members. Based on the burden of disease, the results of this study can also

suggest a specific amount to be applied for health insurance reimbursement for those patients (sub-questions 4 and 8).

Health utilities

Another way of measuring the burden of disease from the perspective of patient-reported outcomes is to measure health utilities. In Chapter 5 we not only presented evidence on health utility among hypertensive patients in Vietnam but also used that result to weight the health utility of other health states, such as the 'healthy', 'stroke', or 'myocardial infarction' states, citing utility values from other studies when needed for a further analysis [7]. Health utilities in this hypertensive population were indeed lower than in the general population [11]. We also found lower health utilities among patients who were older, female or had more than three comorbidities [10]. The value of health utilities among hypertensive patients could potentially contribute to analysis of global health issues; it has, for example, not yet been shown in the Global Burden of Disease database [1].

Cost effectiveness of screening

In the context of the current lack of evidence to guide hypertension management in Vietnam, there was a need to identify how to integrate screening for hypertension into routine care and coverage by health insurance. We therefore conducted a study on cost-effectiveness of different strategies to screen for hypertension that applied local data. The result suggested that an optimal screening strategy would be based on age, sex and screening interval (such as annual or biannual) and should be combined with enhanced coverage of treatment. A strategy of regular screening of males starting at 35-, 45-, or 55 years and of females at 55 years exhibited high probabilities of being cost-effective in all variants (main question and sub-questions 7 and 8). Even though we believe that our model provides the best evidence so

far to guide screening in Vietnam, we do note considerations in the interpretation of the modelling study, because certain important aspects have yet not been integrated in the model. First, differences in reductions in relative risk for CVD among patients with or without a history of CVD are not integrated in the model. However, a recent meta-analysis showed that the effect of treatment of high blood pressure in reducing the risk of CVD (including IHD and stroke) was similar in patients with or without a history of CVD. Notably, the risk of CVD is higher in people with a history of CVD but the reduction in risk of CVD is also larger [23]. That means, for the modelling exercise, we could justify applying the same risk reduction rate for both groups of patients. Second, adherence to medicine is a huge issue as it is directly associated with clinical outcomes [24], but adherence has not yet been adequately integrated in the model. Therefore, the model should be updated on this aspect when further adherence data in relation to clinical outcomes become available.

Limitations

Most of the research questions posed at the start of this thesis have been answered; two still remain with specific aspects to be addressed. The first question is on how adherence to treatment will influence clinical outcomes and the second concerns the future risks of CVD in various scenarios of non-treatment or non-adherence. Studies on the effects of medication adherence among hypertensive patients on outcomes such as MI or stroke have been conducted in Italy and The Netherlands [25, 26], but we still lack such evidence for developing countries. We conducted a prospective study in which patients were followed for one year, however we were not able to record complications such as MI or stroke for various reasons. Firstly, up to now, Vietnam does not have a health information system recording

clinical data for these types of diseases. Secondly, when patients are to be hospitalized, they have the right to choose which health facility they will use, and there is no formal feedback system to ensure that the relevant data come back to the community health center. Thirdly, it may be difficult for patients to remember exactly what their diagnosis was, so when trying to obtain data by interviewing them later, we expect a strong effect of recall bias.

The number of subgroups integrated into the modelling exercises was lower than specified as optimal.

The first reason was that half of the patients were non-adherent to medication and further detailing per patient subgroup appeared difficult [12]. In Chapter 4, the finding is reported that costs for hospitalization as a result of hypertension were high compared to annual treatment [6]. However, we could not obtain data on the actual prevalence of hospitalization due to uncontrolled high blood pressure among those either on current treatment or non-treated or non-adherent. That is why we could not take those groups separately into account in the model.

Secondly, no data are available on the association between adherence to medical treatment and the occurrence of CVD complications. Therefore, we had to assume that patients on treatment are adherent and we could not deal with the potential issue of lower adherence and the resulting higher CVD risk.

Finally, we applied data from a CVD risk prediction model to explore trends in Vietnam. The current model has not yet been validated for application in the Vietnamese population [27]. This has to be done in future when the required data become available.

Future prospects

Apart from addressing the data limitations described above, further research could focus on influence of adherence to treatment on outcomes and the future risks of CVD in case of non-treatment or non-adherence. These studies should be conducted to provide the data needed for predictions and planning of hypertension management. Association of adherence and its outcome will take into account for a scenario of the cost-effectiveness analysis.

In Chapter 4, we suggested several factors that may influence adherence to medicines. A review on interventions to improve adherence to treatment has been published [28] but we still need to identify appropriate solutions to increase coverage of treatment and adherence to medicines in the Vietnamese setting. Furthermore, interventions to improve adherence and an analysis of the cost-effectiveness of improving adherence are needed for developing countries, within the context of a health-economics adequately incorporating adherence as one important element.

Recommendations & Conclusions

Previous reports on health economic evaluation recommended several interventions to reduce the burden of cardiovascular diseases, such as treatment of hypertension, treatment of hypertension combined with treatment of CVD events, and population-based mass media strategies aimed at reducing levels of cholesterol and dietary salt intake [2]. Our study adds additional evidence to inform managers and policy-makers who are developing guidelines for management of hypertension in Vietnam (sub-question 8). Screening for hypertension is cost-effective in cardiovascular prevention and therefore screening for hypertension

could be integrated into routine health practice with a focus on those over 35 years for males and over 55 years for females.

Even though efforts to encourage patients to adhere to medicines as prescribed is challenging from both the clinical and the economic perspectives, we found that increasing the coverage of treatment and improving adherence to treatment are very important interventions to reduce the burden of disease. In addition, from fieldwork and a previous study [1], we recognized that adherence to screening also needs to be emphasized. Therefore, with regard to adherence, experience from our study suggests that programs to encourage people to undergo screening for hypertension as well as adherence to screening need attention, especially in remote or mountainous areas.

Multiple models to predict CVD risk have been introduced in recent years. Doctors have several choices but that also makes it difficult to select the most suitable model to apply in Vietnam. Our study suggested that models developed on The Asian and Chinese Multiple-provincial Cohort Study are potentially appropriate to apply in the current context in which real data is lacking to develop a local model.

For continued monitoring and planning of hypertension management, the Ministry of Health should create a database system that can share information on disease history, clinical data and treatment for chronic disease, as these aspects require continuous attention. The data could also serve to update the model. An electronic health information system to follow chronic patients would create major benefits for clinical practice, monitoring risk factors, research and ultimately for policy makers to manage non-communicable disease.

The results presented in this thesis provide additional evidence that hypertension importantly contributes to the current burden of disease in Vietnam, from both clinical and economic perspectives. Prediction

of risk using the Asian and China models may be used as tools in estimating CVD risk in Vietnam and seem valid, while further analyses using real-life data for confirmation are needed. Health utilities of hypertensive patients could serve as a reference in a similar setting, although not yet reported in the Global Burden of Disease database. The value of the costs of hospitalization of hypertensive patients could serve as a reference for reimbursement by insurance companies. Medication adherence is an issue that needs to be considered in hypertension management.

All the evidence gathered, together with the integration into results of the modelling study, leads me to strongly recommend that screening and managing hypertension should be integrated into routine care, using age as guiding factor.

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